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FLORISTIC STUDIES IN INDIAN UNIVERSITIES

C. J. Saldanha

St. Joseph's College, Bangalore

The word Floristics generally evokes old-fashioned methods in handling dried specimens in a herbarium without any of the glamour of sophisticated instrumentation in gleaming laboratories. Taxonomy, on which Floristics so strongly relies, is often regarded as confusing. Hardly are the diagnostic characters of a taxon mastered, than a list of exceptions seems to obliterate these traits. Botanical names become tongue-twisters, too frequently relegated to synonymy under the provisions of an apparently mysterious code. Students with a very sense of humour have dubbed Taxonomy 'Tax on me'. At the level of field work Floristics entails exhausting treks and expensive travel often to inaccessible places in inclement weather. Many Botany students may prefer the comfortable routine of the laboratory to the challenge of Floristics.

This situation is unfortunate, for it reflects a distorted conception of Floristics and its part in the well-being and progress of the country. Fortunately, the importance of the vegetational cover in the bioenergetics of the planet Earth is being realised in many technologically advanced countries. Our developing country cannot afford to ignore the role of plant-life in the oxygen, carbon and nitrogen cycles, in the soil and water regimes, food and forest resources and in industrial and medicinal applications. Unless the Universities help the intelligentia in knowing our floral wealth and in understanding the how and why of the various floristic patterns, no proper planning, rational utilisation and effective conservation is possible. The scientific endeavour in our halls of learning is bound to be deficient unless Floristics forms an integral and important part of this endeavour.

Interest in Floristics has to be developed much before our youth reach a University. An intelligent awareness of the plant life around the student, and an appreciation of its role in regulating the quality of the environment are essential in any high school curriculum. However, there is not much in the form of books and audio-visual aids that is genuinely Indian, and related to Indian conditions, to help in creating this interest and awareness. The Films Division of the Government of India has produced several reels on animal life but scarcely anything significant on the role and importance of the vegetation. The Botanical Survey of India could take an initiative in this matter. The chains of Nature Clubs sponsored by the World Wild Life Fund could be another vehicle to achieve much at this level. The Bombay Natural History Society is planning an Encyclopaedia on Indian Natural History for secondary school children. All these could help in creating an interest in Floristics even at the pre-University level.

At the under graduate level the teaching of Taxonomy and Floristics has to have a dual objective—giving a student an adequate scientific background to serve as a foundation for the pure and applied aspects of the discipline, while simultaneously developing an intelligent, balanced and creative person capable of facing the real-life situations of a rapidly changing scientific world. Many a student has taken a positive dislike to taxonomy and floristics because of ill-prepared teachers handling a complex subject. Students are often overwhelmed with dry morphology, endless terminology and an overdose of specifice without being led on to the levels of analysis, synthesis and application, so essential in any educational process. However, when a teacher has adopted an interesting and pedagogically sound approach, the results have been gratifying. A recent seminar on the 'Teaching of Plant taxonomy' organised in Bangalore, drew over a hundred lecturers eagerly seeking to fathom the dimensions of the subject, and find better teaching methods.

A limited number of field trips under expert guidance can give a first-hand knowledge of the vegetation, succession patterns phenological variations and environmental impact. The wet method of collection can eliminate a great deal of drudgery associated with plant pressing, and leave more time for scientific observations and analysis.

Most of those who take up Botany at the undergraduate level do not become professional Botanists. It is all the more important that they form the enlightened community which will support and appreciate the efforts of the Professional in the science of Floristics.

The status of Floristics at the Post graduate level varies from University to University. A Master's degree by the presentation of a thesis on floristics is still possible in some Indian Universities. This however, is not to be encouraged, as it generally leads to a very narrow scientific background and a limited horizon. Several Universities have taxonomy as a special paper for the Master's or accept a dissertation on Floristics as part of the requirements for the degree. Others have at least one semester in a general course devoted to this branch of Botany.

While, being fully aware of the limitations of time in framing a syllabus, we nevertheless feel that a course that does justice to the subject should at least cover the following main fields.

A. Core matter :

1. A synoptic view of the taxonomic characteristics at the family level with the capacity to determine genera and species with the help of standard floristic works.
2. A proper grasp of the principles of plant classification, of the basic philosophy of the different systems and an ability to move from one system to another.
3. An adequate knowledge of floristic literature, including floras, monographs, pertinent journals combined with a capacity to handle source books like indices, abstracts and bibliographies.
4. Sufficient knowledge of the code of nomenclature and the ability to apply it to specific cases.
5. Ability to prepare dichotomous keys or multi-access systems, give citations and work the nomenclature according to international usage, write up compact family, generic and species descriptions.

6. Familiarity with methods of graphic presentations through drawings, graphs, histograms, phenograms and scatter diagrams.
7. Field work which is holistic in its approach and includes not merely collection and identification of plants but also species spectra, vegetational profiles etc.
8. Herbarium techniques for the preparation, maintenance and study of preserved specimens, together with the capacity to locate types and evaluate them.

B. Biosystematics :

The limitations of alpha Taxonomy in unravelling taxonomic and floristic complexes are evident. Data obtained from several fields of plant sciences may be needed for sound taxonomic judgement regarding variations, speciation, isolation or hybridization.

This not only needs methodology to collect evidence from anatomy, embryology, palynology, cytology and genetics, but also the capacity to evaluate this evidence.

Since chemosystematics is contributing more and more to our understanding of plant metabolites and their inter-relationships, familiarity with the function and use of several microanalytic instruments is necessary. The course therefore, needs a background of biochemistry and more than an acquaintance with calorimetry, spectrophotometry and the various types of chromatography.

The study of ultrastructures is also adding a new dimension to morphology. Evidence obtained through the Scanning Electron Microscope (SEM) should therefore form part of the biosystematic approach.

Several Universities have active centres where some or all of these areas are being investigated. However, it is the systematist who has to evaluate the evidence from these investigations and arrive at a taxonomic judgement before incorporating the results in floristics.

C. Interdisciplinary areas :

Besides telling us which plants grew in a particular region, Floristics tries to understand why a relatively stable assemblage of plants establishes itself in a given area.

Climatology, Geotectonics, Geology and Soil Sciences have to be understood in order to evaluate the physical and chemical forces that mould a flora.

Zoology, especially entomology is needed to understand the interactions taking place between plants and animals in the ecosystem.

Statistics and Calculus are indispensible in quantifying many a biological phenomenon.

Computer data banks with their storage and retrieval systems are handy tools in modern floristics. A knowledge of the possibilities of these developments would certainly enhance the quality of floristic work.

A set up for floristic training of this amplitude scarcely exists in any of our Indian Universities. And yet, if we really want to know the floral wealth of our country, understand its origin, appreciate its role and predict its future, such a set up is a necessity.

It is therefore, imperative that at least a few Universities or Institutes set up such a course. While the core area could be handled by Systematists, the collaboration of the other Departments in a University or College could be availed of to the extent needed in the interdisciplinary area.

While the move initiated by Prof. Taktajan in 1972 to set up a Centre for Taxonomic Studies did not materialise, it is gratifying to note that the proposal to set up a special course in Taxonomy and Floristics is once again under the active consideration of the University Grants Commission.

Besides the training of scientists in the field of Floristics, the Universities could also collaborate with the B. S. I. in the preparation of local floras and in the flora of India Project.

A new *Flora of India* has to be more than a mere reshuffling of genera and species by incorporating findings of other taxonomic revisions. It must be an actual assessment of the floral wealth of India as it stands today, indicating the changes that have taken place in the last hundred years or so and leading to fair predictability based on land usuage and developmental plans. This presupposes intensive exploration throughout the country, proper documentation followed by taxonomic and floristic analysis. The Flora should incorporate elucidations of taxonomic complexes occurring in the country through original monographic work. Taking into account the migratory trends in the Indian flora, neighbouring regions should also be covered. Nomenclatural synonymy will have to be worked out after a proper location and examination of types and the percolation of the results through Jeffrey's Nomenclatural filter. Taxonomic synonymy, especially in dealing with complexes may often require monographic work based on biosystematic studies.

Dr. van Steenis is of the opinion that monographic work can only be done in the bigger centres while the smaller centres should take up intensive local floristic studies. The difficulty in obtaining types, the lack of library facilities, the restricted herbarium material—all these, according to him make monographic work in the smaller centres quite difficult. For us in India, even the Central National Herbarium suffers from some of these disadvantages. Most of the holotypes of our binomials are outside the country and obtaining loans of these types is difficult and risky. The IDC microcards of the Linnaean, Wallichian, Thunberg and other herbaria are helpful but have limitations of their own. Several other holotypes have not been documented at all. Filling in these lacunae by high quality photographs should be a high priority task.

While agreeing with Dr. van Steenis to a certain extent, we nevertheless feel that even those in the smaller University and College centres can contribute to the Flora of India Project by a judicious combination of work in the University, at the Central National Herbarium, Calcutta and even at the Royal Botanic Gardens at Kew.

Workers at the University can be grouped into three categories. 1. Junior researchers working either for an M. Phil. or Ph.D. degree. 2. Research assistants not working for a degree but helping University Professors who have a full-time work load of their own. 3. Senior/Researchers/Professors who have spent several years in Taxonomy and Floristics and have specialised in one or other group of plants.

If the *Flora of India* should be of the required international standards, the cooperation of the third category of scientists in the Universities is likely to give the best results. The B. S. I. has been asking for this cooperation, but has no provision to meet the basic expenses involved in such work. The present scheme of scholarships caters only to the first type of collaboration which by its very nature represents initial efforts by relatively inexperienced workers. The B. S. I. and the Government should review this situation and could come up with appropriate solutions.

To sum up, the contribution of the Universities to floristic work in India can be twofold—*first* by upgrading the science through an integrated and modern training system and *second* by the collaboration with the Botanical Survey of India in the writing up of local floras and in original monographic work, especially in unravelling taxonomic complexes.

SECTION III

The Herbaria and Gardens in India